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Kodak

ADVANCED
DATA BOOK

ENLARGING

IN BLACK-AND-WHITE AND COLOR

ENLARGING
IN BLACK-AND-WHITE AND COLOR

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Making Color Enlargements

• If you have a well-equipped darkroom, you can make full-color enlargements on Kodak Ektacolor Paper from Kodacolor or Kodak Ektacolor negatives. Most of the equipment you already have—trays, timer, enlarger—can be used for color as well as black-and-white enlarging. You will also need some color filters to control color balance in the print, and a Kodak Safelight Filter, Wratten Series 10 (dark amber).

While there is nothing especially hard about color printing, you have to follow directions closely. The recommended developer temperature has to be maintained within half a degree F. All other solutions have to be maintained within plus or minus two degrees. You have to observe directions for mixing the processing chemicals carefully. This section is not intended as a complete guide to color printing. It's designed to tell you the basic things you need to know to get started. For the complete story, we urge you to read the Kodak Color Data Book, "Printing Color Negatives."

THE PAPER

Kodak Ektacolor Paper is a multilayer paper designed for making color enlargements from color negatives. It comes in only one contrast grade, for "normal" negatives. The surface has a fairly high gloss, which permits the prints to retain a long tonal range.

Ektacolor Paper must be protected against heat by being stored in a refrigerator at 50 F or lower. You can handle it for limited periods under a safelight fitted with a Kodak Safelight Filter, Wratten Series 10 (dark amber).

ENLARGING EQUIPMENT

Almost any enlarger equipped with a tungsten lamp and a heat-absorbing glass is suitable for making color enlargements. Enlargers equipped with fluorescent lamps aren't generally recommended, because fluorescent lamps are usually deficient in red. When you try to make color prints with them, they require heavy filtration which lengthens exposure times and complicates your filter pack.

Avoid greenish condenser lenses. They may cause shifts in color balance from the center to the edges of the print. The enlarger head should have baffles to prevent stray light from reaching the paper. If the head leaks light, put a hood of aluminum foil or other non-flammable material over it during the exposure.

It's desirable for the enlarger to have provision for putting the color filters used during enlarging between the lamp and the negative. This isn't absolutely necessary, but it makes everything much simpler, as you'll see shortly.

COLOR FILTERS

A set of color filters is needed for controlling color balance in the print. You also need a Kodak Wratten Filter No. 2B or equivalent to absorb ultraviolet radiation. The 2B filter is *always* used.

There are two types of filters. The kind you use depends on where you use the filters—between the lamp and the negative, or in the enlarger beam itself. Kodak Color Printing (CP) Filters are for use between the light source and the negative. They can't be used in the image-forming beam without affecting definition.

Color Compensating (CC) Filters are for use below the enlarger's lens. They are made of gelatin and cost more than CP Filters of the same size. They can be used in the image-forming beam of the enlarger, but you have to handle them carefully and keep them clean.

The numbers and letters used to identify filters tell you their type, density, and color. In the case of a CP20Y filter, for example, the CP stands for Color Printing, 20 means the density is .20 (to blue), and Y means the color is yellow. All the filters use this system for identification.

FILTER REQUIREMENTS

If you follow the system outlined in this book for making color enlargements, you will need the filters listed below. If your enlarger accepts filters *above* the negative, you will need these Color Printing Filters:

CP2B (always used)
CP05R, CP10R, CP20R, CP40R (2 of these)
CP05M, CP10M, CP20M, CP40M
CP05Y, CP10Y, CP20Y, CP40Y.

If your enlarger is constructed so that you have to use the filters *below* the enlarger lens, in the light beam, you will need these Color Compensating Filters:

Wratten 2B (always used) or CP2B (Acetate) installed permanently above the negative.
CC05R, CC10R, CC20R, CC40R, CC50R
CC05M, CC10M, CC20M, CC40M, CC50M
CC05Y, CC10Y, CC20Y, CC40Y, CC50Y

All these filters are needed to permit three or less in the pack. Don't use more than three together at the lens, and preferably not more than two.

Color Printing—Step by Step

- Start by picking a good color negative—a negative which is sharp, free from processing defects, with good detail in both the shadows and important highlights.

Determining Exposure

The next step is to find the right exposure time. If your print is over- or under-exposed, it's almost impossible to judge the color balance accurately. You can approximate the correct exposure by this method:

1. Put the color negative in the negative carrier.
2. Use a trial filter pack of CC50R (plus, of course, the 2B filter).
3. With the enlarger set at the desired magnification, make a test strip on a sheet of Kodak Ektacolor Paper. Use a test strip about one quarter the width of the print to be made.
4. Process the test strip in Kodak Dektol Developer, diluted 1 part stock solution to 2 parts water, for 1½ minutes at 68 F.
5. Pick the best-exposed segment of the test strip. The print itself will require about one-half stop *less* exposure when it's processed in Process P-122.

CHOOSING THE FILTER PACK

After choosing an exposure time, set the enlarger lens and timer. Next you have to pick the color filters that will give you good color balance. The filter pack already mentioned is a good starting point for most negatives. You can check your print against the color "ring around" on pages 32-33 to see in what direction the changes should be made. The next sections give a step-by-step "cook book" approach to the problem of choosing the right filters.

With Kodak Color Printing Filters (Acetate) Above the Negative

Make a print using this filter pack: 50M + 50Y. (You "build" this filter pack by combining 40M + 10M + 10Y + 40Y.) After the print is processed and dried, decide if any color is in excess. If it is, proceed as follows:

What color is in excess? Is the print too red, green, blue, cyan, magenta, or yellow?

How much is that color in excess? Very slight, slight, more, or a lot?

Apply this decision about color to Table I. Replace the 50M + 50Y filters with those under "New Filter Pack." Find the corrected exposure time under the time you found best and opposite the new filter pack. This time is corrected for the difference between packs. Make a new print.

Example: The test strip was exposed through filters 40M + 10M + 40Y + 10Y for 10, 12, 16, 20, 25, and 32 seconds. The 16-second area is best for density. It is slightly red.

In the "Too Red" part of the table, "Slight" calls for a 40M + 20M + 40Y + 20Y. So replace the 10M and 10Y with 20M and 20Y.

Under 16 seconds in the top line of the table and along the "Too Red, Slight" line, find your new exposure time. This is 19 seconds.

With experience, the print so made will be good. To get a darker print, increase exposure time. If the print needs further color correction, apply Table II.

No change in exposure is needed for the Y filters or for the 05M. For other M filters, multiply exposure time by these factors:

Filter added	10M	1.2	20M	1.3	30M	1.5
Filter subtracted	10M	0.9	20M	0.8	30M	0.7

These factors assume that the number of filters in the pack does not change. Add 10% to the exposure time for each filter added, subtract 10% for each filter removed.

For the next negative, start with the filter pack finally used for the first good print.

TABLE I. CHANGES IN COLOR PRINTING FILTERS (ACETATE) AND CORRECTED EXPOSURE TIMES

	IF PRINT IS	NEW FILTER PACK	BEST EXPOSURE TIME (IN SEC) FOR CP 40R+10R										Factor
			5	6	8	10	12	16	20	25	32	40	
			Time Corrected For New Filter Pack										
TOO RED	VERY SLIGHT	40R+05R+10R	6	7	10	12	14	19	24	30	38	48	1.2
	SLIGHT	40R+20R	6	7	10	12	14	19	24	30	38	48	1.2
	MORE	40R+20R+10R	7.5	9	12	15	18	24	30	38	48	60	1.5
	A LOT	40R+40R	8	10	13	16	19	26	32	40	51	64	1.6
TOO GREEN	VERY SLIGHT	40R+05M+10Y	5	6	8	10	12	16	20	25	32	40	1.0
	SLIGHT	40R+10Y	4.5	5.5	7	9	11	14	18	23	30	36	.9
	MORE	10R+20M+40Y	4	5	6.5	8	10	13	16	20	26	32	.8
	A LOT	20M+40Y+10Y	3.5	4	6	7	8	11	14	18	22	28	.7
TOO BLUE	VERY SLIGHT	40R+10M+05Y	6	7	9	11	13	18	22	28	35	44	1.1
	SLIGHT	40R+10M	5	6	8	10	12	16	20	25	32	40	1.0
	MORE	10R+40M+20Y	5	6	8	10	12	16	20	25	32	40	1.0
	A LOT	40M+10M+20Y	5	6	8	10	12	16	20	25	32	40	1.0
TOO CYAN	VERY SLIGHT	40R+05R	4.5	5.5	7	9	11	14	18	23	30	36	.9
	SLIGHT	40R	4	5	6.5	8	10	13	16	20	26	32	.8
	MORE	20R+10R	4	5	6.5	8	10	13	16	20	26	32	.8
	A LOT	20R	3	3.5	5	6	7	10	12	15	20	24	.6
TOO MAGENTA	VERY SLIGHT	40R+10R+05M	6	7	10	12	14	19	24	30	38	48	1.2
	SLIGHT	40R+10R+10M	7	8	10	13	16	21	26	32	42	52	1.3
	MORE	40R+10R+20M	7	8	11	14	17	22	28	35	45	56	1.4
	A LOT	40R+10Y+40M	8	10	13	16	19	26	32	40	51	64	1.6
TOO YELLOW	VERY SLIGHT	40R+10R+05Y	6	7	9	11	13	18	22	28	35	44	1.1
	SLIGHT	40R+10R+10Y	6	7	9	11	13	18	22	28	35	44	1.1
	MORE	40R+10R+20Y	6	7	9	11	13	18	22	28	35	44	1.1
	A LOT	40R+10M+40Y	6	7	9	11	13	18	22	28	35	44	1.1

These factors are given only for use with times not covered here.

TABLE II. FINAL CHANGE (if needed) IN FILTER PACK

Amt. of Desired Change If Print is too . . .	Very Slight	Slight	More	A Lot
red	add 05R	add 10R	add 20R	add 30R
green	subtract 05M	subtract 10M	subtract 20M	subtract 30M
blue	subtract 05Y	subtract 10Y	subtract 20Y	subtract 30Y
cyan	subtract 05R	subtract 10R	subtract 20R	subtract 30R
magenta	add 05M	add 10M	add 20M	add 30M
yellow	add 05Y	add 10Y	add 20Y	add 30Y

THE KODAK COLOR PRINTING FILTER CP2B SHOULD ALWAYS BE IN THE LIGHT BEAM.

With Kodak Color Compensating Filters Below the Lens

Make your first print using this filter: CC50R. Remember that the 2B is always included in all filter packs. After the print is processed and dried, decide if any color is in excess. If it is, proceed as follows:

What color is in excess? Is the print too red, green, blue, cyan, magenta, or yellow?

How much is that color in excess? Very slight, slight, more, a lot?

Apply this decision about color to Table A. Replace the 50R filter with those under "New Filter Pack." Find the corrected exposure time under the time you found best and opposite the new filter pack. This time is corrected for the difference between packs. Make a new print.

Example: The first test strip was exposed through the 50R filter for 10, 12, 16, 25, and 32 seconds. The 16-second area is best for density. It is slightly red.

In the "Too Red" part of the table, "Slight" calls for a 50R + 10R. So add the 10R.

Under 16 seconds in the top line of the table and along the "Too Red, Slight" line, find your new exposure time. This is 21 seconds.

With experience, the print so made will be good. To get a darker print, increase exposure time. If the print needs further color correction, apply Table B.

No change in exposure is needed for the Y filters or for the 05M or 05R. For the 10, 20, and 30 R or M filters, multiply exposure time by these factors:

Filter added	10 — 1.2	20 — 1.3	30 — 1.5
Filter subtracted	10 — 0.9	20 — 0.8	30 — 0.7

These factors assume that the total number of filters in the pack does not change. Add 10% to the exposure time for each filter added, subtract 10% for each filter removed.

For the next negative, start with the filter pack finally used for the first good print.

TABLE A. CHANGES IN GELATIN CC FILTERS AT THE LENS AND CORRECTED EXPOSURE TIMES

	IF PRINT IS	NEW FILTER PACK	BEST EXPOSURE (IN SEC.) TIME FOR CC50R										Factor
			5	6	8	10	12	16	20	25	32	40	
			Time Corrected For New Filter Pack										
TOO RED	VERY SLIGHT	50R+05R	6	7	10	12	14	19	24	30	38	48	1.2
	SLIGHT	50R+10R	7	8	10	13	16	21	26	32	42	52	1.3
	MORE	50R+20R	7.5	9	12	15	18	24	30	38	48	60	1.5
	A LOT	50R+30R	8.5	10	14	17	20	27	34	42	58	68	1.7
TOO GREEN	VERY SLIGHT	40R+05M+10Y	6	7	10	12	14	19	24	30	38	48	1.2
	SLIGHT	40R+10Y	5	6	8	10	12	16	20	25	32	40	1.0
	MORE	30R+20Y	4	5	7	8.5	10	14	17	21	27	34	.85
	A LOT	20R+30Y	4	4.5	6	7.5	9	12	15	19	24	30	.75
TOO BLUE	VERY SLIGHT	40R+10M+05Y	6	7	10	12	14	19	24	30	38	48	1.2
	SLIGHT	40R+10M	6	7	9	11	13	18	22	28	35	44	1.1
	MORE	30R+20M	6	7	9	11	13	18	22	28	35	44	1.1
	A LOT	20R+30M	6	7	9	11	13	18	22	28	35	44	1.1
TOO CYAN	VERY SLIGHT	40R+05R	6	7	9	11	13	18	22	28	35	44	1.1
	SLIGHT	40R	4.5	5.5	7	9	11	14	18	26	29	36	.9
	MORE	30R	4	5	6.5	8	10	13	16	20	26	32	.8
	A LOT	20R	3.5	4	5.5	7	8.5	11	14	18	22	28	.7
TOO MAGENTA	VERY SLIGHT	50R+05M	6	7	10	12	14	19	24	30	38	48	1.2
	SLIGHT	50R+10M	7	8	10	13	16	21	26	32	42	52	1.3
	MORE	50R+20M	7	8	11	14	17	22	28	35	45	56	1.4
	A LOT	50R+30M	8	10	13	16	19	26	32	40	51	64	1.6
TOO YELLOW	VERY SLIGHT	50R+05Y	6	7	9	11	13	18	22	28	35	44	1.1
	SLIGHT	50R+10Y	6	7	9	11	13	18	22	28	35	44	1.1
	MORE	50R+20Y	6	7	9	11	13	18	22	28	35	44	1.1
	A LOT	50R+30Y	6	7	9	11	13	18	22	28	35	44	1.1

These factors are given only for use with times not covered here.

TABLE B. FINAL CHANGE (if needed) IN FILTER PACK

Amt. of Desired Change If Print is too . . .	Very Slight	Slight	More	A Lot
red	add 05R	add 10R	add 20R	add 30R
green	subtract 05M	subtract 10M	subtract 20M	subtract 30M
blue	subtract 05Y	subtract 10Y	subtract 20Y	subtract 30Y
cyan	subtract 05R	subtract 10R	subtract 20R	subtract 30R
magenta	add 05M	add 10M	add 20M	add 30M
yellow	add 05Y	add 10Y	add 20Y	add 30Y

THE KODAK WRATTEN FILTER NO. 2B SHOULD BE INCLUDED IN ALL FILTER COMBINATIONS.

Color Processing

The purpose of this section is to supplement the instructions packaged with the Kodak Color Print Processing Chemicals, Process P-122. The instructions should be consulted for details of the processing steps.

Tray processing is covered here in some detail because this method offers the possibility of getting started in color printing with a minimum outlay for equipment.

SOLUTIONS

All the chemicals necessary to mix processing solutions for Kodak Ektacolor Paper are supplied in prepared form. The Kodak Color Print Processing Kit, Process P-122, is supplied in 1- and 3½-gallon sizes. Processing instructions and a summary of the steps are included. Chemicals for mixing individual solutions are available separately in 1-, 3½-, 10- and 25-gallon sizes. A separate Developer Replenisher is supplied in 5- and 25-gallon sizes. Replenishers for the other solutions can be prepared by dissolving the regular chemicals in the amount of water specified on the package label.

Mixing. The directions for mixing the processing solutions are given on the labels of the containers. Follow these directions carefully—be sure to use the full volume of water at the proper temperature; add chemicals in the order specified; and make sure that each is completely dissolved before adding the next. If possible, the chemical mixing area should be separate from the printing area, because chemical dust on unprocessed paper may cause contamination spots.

Capacity. When used in a shallow tray, the Developer should be discarded after a single use. Otherwise it will be very difficult to achieve consistent print quality. The other solutions can be used in trays up to the normal exhaustion point.

Handling Chemicals. Particularly when processing is done in trays, it is essential that clean rubber gloves be worn to avoid skin irritation. Gloves should be flexible and cover the wrist. Fingertip grips are useful, but thin, surgical-type gloves afford a maximum of fingertip sensitivity. Sprinkling ordinary talcum powder in the gloves will make them more comfortable to wear. Be sure to read the section "Precautions in Handling Chemicals" in the instructions for Process P-122.

TIME AND TEMPERATURE

The recommended agitation varies, depending on the equipment in use, but time and temperature are standard.

Timing. Either tray or tank processing requires a timer with a sweep second hand that can be followed in the dark. The dial can be phosphorescent or it can be illuminated with a safelight lamp fitted with a Kodak Safelight Filter, Wratten Series 10.

The time required for each processing step includes the draining time. In each case, start draining in time to end the processing step (and start the next one) on schedule.

Temperature Control. Although you can buy fairly elaborate devices for controlling temperatures, an ordinary mixing faucet can be used. With such an arrangement, a thermometer placed in the water flow near the developer tank must be watched constantly to make sure that varying loads on the water supply lines do not change the temperature of the mixture.

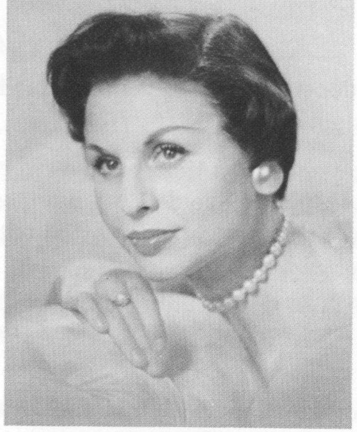
One convenient arrangement is to connect the mixing faucet through a rubber hose to a widemouthed flask or bottle fitted with a three-hole stopper. The incoming water mixture is led to the bottom of the flask with copper or glass tubing. The outlet tube, on the other hand, projects only slightly below the bottom of the stopper. The third hole serves to hold the thermometer, which should be an accurate one.

Eliminating Wash Bubbles. When hot water is mixed with cold water containing large amounts of dissolved air, an effervescent wash water results. The prints become covered with a layer of air bubbles which prevents adequate washing. If an aspirator (a common laboratory filter pump) is installed in the water line and adjusted to permit a steady flow of air into the wash water, the small bubbles will not form.

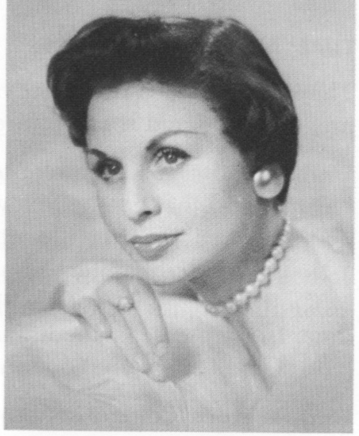
TRAY PROCESSING

Only three processing trays plus a washing tray are required, because the room lights can be turned on after the paper is placed in the First Fixing Bath. The three solution trays can then be emptied, rinsed *thoroughly*, and used for other processing solutions. Do not use chipped or cracked trays, because they may give rise to iron contamination.

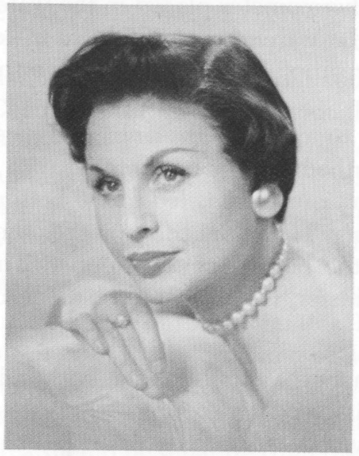
The paper is slippery when wet, and care must be exercised to



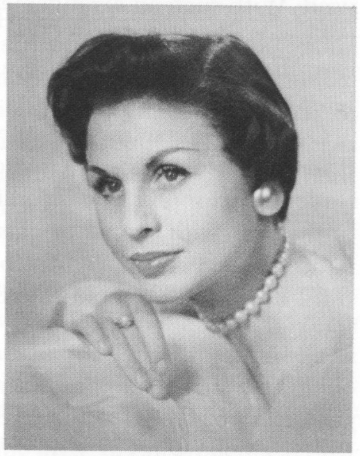
TOO RED



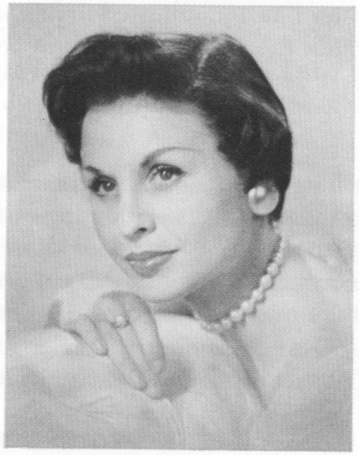
TOO CYAN



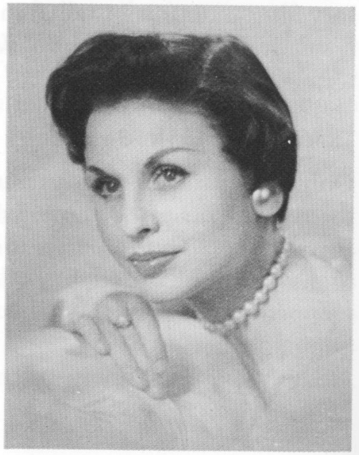
TOO MAGENTA



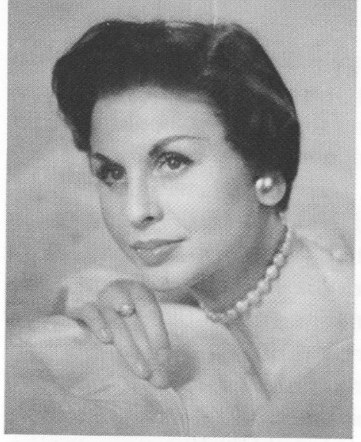
TOO GREEN



TOO YELLOW



TOO BLUE



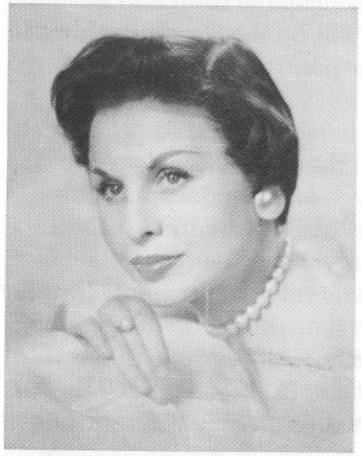
½ STOP OVEREXPOSED

PRINTS WITH POOR COLOR BALANCE AND EXPOSURE

Study the color prints at left to become familiar with the appearance of poor color balance in test prints and overexposed and underexposed prints. The light and dark prints depicted can be corrected by changing the lens opening ½ stop. The off-color prints differ from the desired color balance by a CC10 filter strength. That is, if a CC10 filter of the color in excess were added to the printing filter pack, the desired color balance would be obtained.

In Color-Printing Method No. 1, each off-color print at left could be corrected by selecting, from the chart on the next page, a new filter pack one step away from the basic filter pack and in the direction of the excess color.

These illustrations and instructions are taken from the Kodak Color Dataguide.



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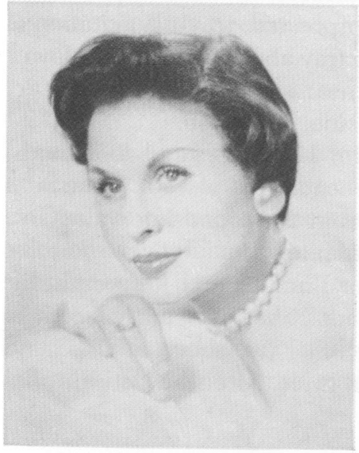
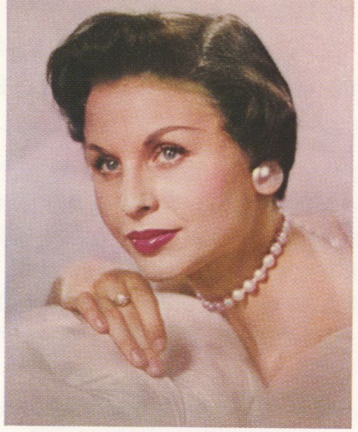
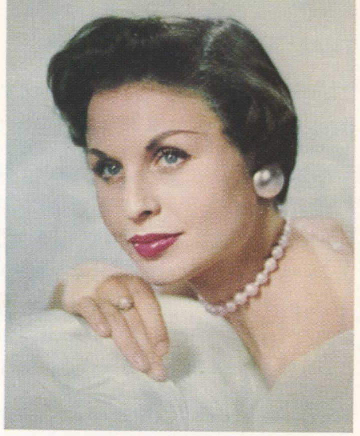


½ STOP UNDEREXPOSED



TOO RED



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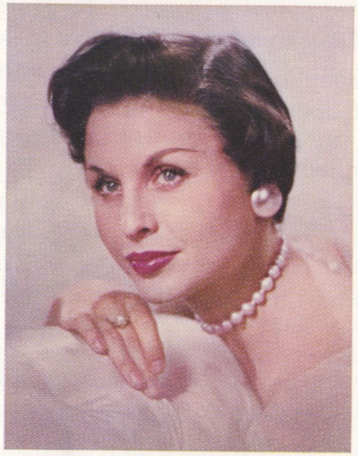

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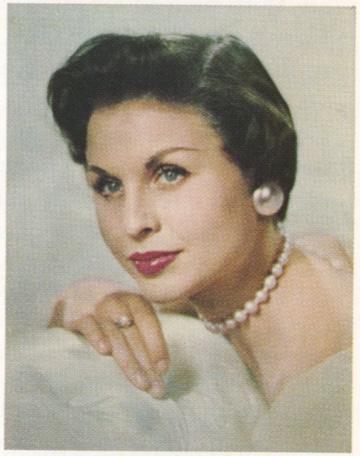
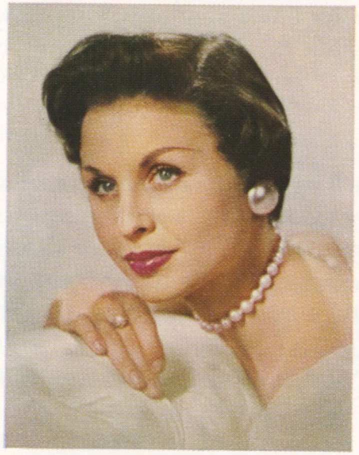
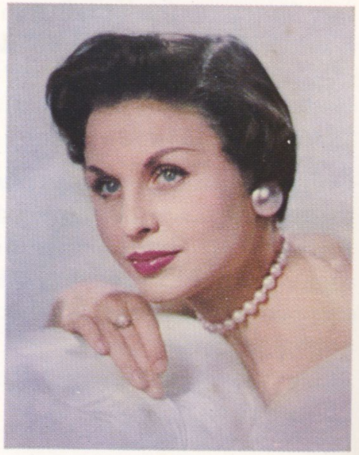


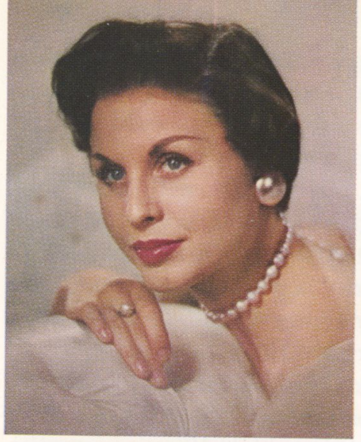
TOO GREEN



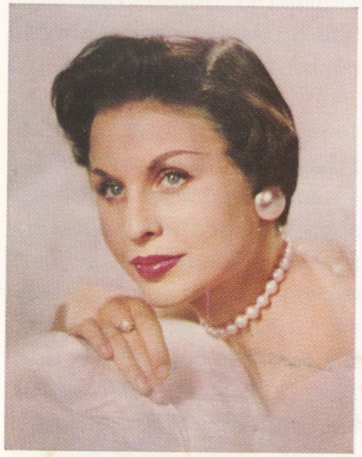
TOO YELLOW



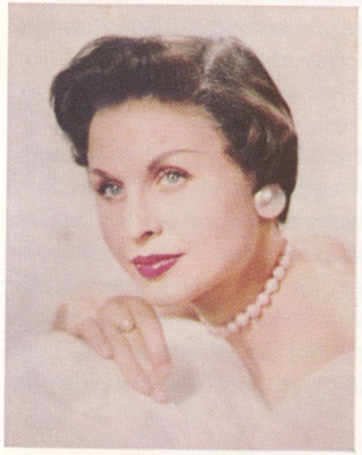
TOO BLUE



½ STOP OVEREXPOSED



NORMAL



½ STOP UNDEREXPOSED

PRINTS WITH POOR COLOR BALANCE AND EXPOSURE

Study the color prints at left to become familiar with the appearance of poor color balance in test prints and overexposed and underexposed prints. The light and dark prints depicted can be corrected by changing the lens opening ½ stop. The off-color prints differ from the desired color balance by a CC10 filter strength. That is, if a CC10 filter of the color in excess were added to the printing filter pack, the desired color balance would be obtained.

In Color-Printing Method No. 1, each off-color print at left could be corrected by selecting, from the chart on the next page, a new filter pack one step away from the basic filter pack and in the direction of the excess color.

These illustrations and instructions are taken from the Kodak Color Dataguide.

avoid digging the emulsion of one sheet with the corner of another. With experience, up to six prints can be processed in trays at one time. For best results, however, not more than three prints should be processed at a time. The procedure is as follows:

1. Place in the sink three trays filled, respectively, with Developer, Stop Bath, and First Fixing Bath. To decrease the risk of contamination, the trays should be well separated. About 1 quart of each of the processing solutions is necessary for 8 x 10-inch prints in 8 x 10-inch trays; correspondingly larger volumes of solution are needed when larger prints are processed in larger trays.

2. Adjust the Developer to 75 F. If a water bath is used to maintain the temperature within the required tolerance of ½ F, make sure there is no danger that the water level will rise too high during processing.

3. Turn out the white lights and notch or clip the corner of one of the sheets of paper to be processed. This will be the "lead print"; make the notch or cut just large enough for positive identification in the dark.

4. Start the time and simultaneously immerse the lead print, emulsion side down, in the Developer. Push the print to the bottom of the tray to make certain it is thoroughly wet with solution. Start the second and third sheets in the same way, at 20-second intervals. Take care to prevent the sheets from adhering to one another.

5. During the development, agitate the prints once a minute by pulling the bottom sheet out, placing it on top without draining, and re-immersing it completely. Follow quickly with the second and third sheets. One interleafing cycle takes about 15 seconds. Each sheet is handled once a minute, and at the end of each cycle the lead print is on the bottom. Try to keep the agitation cycle as smooth as possible, to avoid damaging the soft emulsion surfaces.

If only one sheet of paper is being processed, tray-tilt agitation is recommended. Raise the left side of the tray about 2 inches and lower it smoothly; then raise and lower the near side; next the right side, then again the near side, then the left side, and so on.

6. After it has been in the Developer for 11 minutes and 40 seconds, pick up the lead print, drain it for 20 seconds, and place it in the Stop Bath. Repeat with the other two sheets at 20-second intervals. Give interleafing agitation at the end of 1 minute.

7. After it has been in the Stop Bath for 1 minute and 40 seconds, lift the lead print out of the tray, drain it for 20 seconds, and place it in the First Fixing Bath. Repeat with the other two sheets at 20-second intervals, continuing the same agitation cycle. After the last print has been placed in the First Fixing Bath, turn on the white lights and continue processing as outlined in the Process P-122 instructions.

DRYING

The simplest method of drying is to squeegee prints and hang them up in pairs fastened back to back with film clips or spring clothespins. Prints can also be laid, emulsion side up, on frames covered with plastic screening or cheesecloth, or on sheets of Kodak Blotting Paper. Never put a print in a blotter roll or between blotters, because the soft emulsion will adhere to any such surface.

To minimize curl, use decorator's masking tape to fasten the wet prints temporarily to a suitable flat surface, such as a clean, enameled table top or a sheet of hardboard. The prints will then lie reasonably flat when they are dry.

MOUNTING PRINTS

Kodak Dry Mounting Tissue can be used for mounting prints if the cover sheet used over the face of the print has been preheated to remove residual moisture and if the temperature of the mounting press is no higher than is necessary to secure a satisfactory bond. The actual temperature across the heating plate should range between 200 and 220 F. A household iron can be used if it can be set for synthetic fibers.

Kodak Rapid Mounting Cement is satisfactory with color prints. Arabol Adhesive GRC-7, sold by Arabol Manufacturing Company, can be used like a paste with small prints or for wet-mounting mural prints.

NOTE: If prints are mounted behind glass, a slight separation should be maintained between the print surface and the glass.

PROCESSING FAULTS

Several variables in processing can affect the quality of color prints adversely. Some of the more common causes underlying quality losses are: lack of cleanliness, incorrect mixing of solutions, incorrect use of solutions, contamination of solutions, and lack of adequate control in the processing procedure.

Following is a check list of errors associated with processing which have specific and recognizable effects.

White-Light Fog. A print made on paper which has been fogged by white light will show yellow, or in extreme cases, orange areas.

Overdevelopment. The result of overdevelopment (excessive development time, temperature, agitation, or replenishment rate) is a print that is darker and slightly more contrasty than a normally developed print. There is also danger of high stain (usually cyan) and of hue shifts over parts of the tone scale as a result of contrast differences among the three dye images.

Underdevelopment. An underdeveloped print (insufficient development time, temperature, or agitation) is lower in contrast than a normal print and usually tends toward yellowish-green color balance.

Safelight Fog. Prints fogged by use of the safelight too close, for too long a time, or with a lamp of higher than recommended wattage, show cyan fog. The degree depends on the amount of fogging exposure.

Developer Contamination. If the Developer becomes contaminated with one of the fixing baths, a print will show cyan color balance due to increased density in the cyan layer.

Cyan fog, especially noticeable in highlight areas, may be caused by tin contamination of the Developer as a result of the use of ordinary tin solder in fabricating a stainless-steel tank. Such tanks should be welded.

Contamination with acid from the Stop Bath or Buffer retards development and causes a pink stain most noticeable in the highlights.

Developer Exhaustion. With exhaustion of the Developer, the density level of prints becomes lighter and the highlights go pink.

Iron Contamination. Iron particles in the wash water or iron salts on the ferrotype surface will cause red spots.

Omission of Buffer. Failure to give this treatment may cause higher-than-normal stain and may impair print stability.

Hardening Difficulties. Inadequate hardening may lead to a lacy or blotchy blue-cyan pattern which becomes visible several days or weeks after processing. The effect of Hardener exhaustion or insufficient agitation may be aggravated by excessive drying or mounting temperatures or by the use of nonrecommended print flatteners.

High-Temperature Drying. Prints dried at temperatures above 180 F may show a yellow cast in the highlights or mottle in uniform areas.

Kodak Enlarging Aids

← **Kodak Timer** Covers all intervals up to sixty minutes. It is spring-wound, and has both minute and split-second hands which can be quickly reset to zero. The timer also can be stopped and restarted without resetting the hands. The tilting base permits adjustment to any angle.

Kodak 2-Way Safelamp → Swivels on socket to give direct or indirect illumination. Gives light in two directions by replacing a metal panel with the appropriate 3¼ x 4¾" filter. 15-watt bulb supplied.

← **Kodak Darkroom Graduates** Glass graduates with pouring lip. Markings in glass show avoirdupois measure. Strong, well-made, these inexpensive graduates are available in three popular sizes: 8, 16, and 32 ounces.

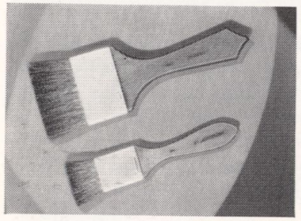
Kodak Darkroom Apron Fabricated of strong waterproof vinyl plastic. → A drip cuff at the bottom catches any liquid spilled on the apron and protects shoes and clothing. The waist cord can be used to hold a towel, while a large pocket provides added convenience. Comes in both medium and large sizes.

Kodak Photo Chamois Useful for removing surplus water and sediment from negatives. Specially treated surface. Two sizes: 9 x 11 and 11 x 13½ inches.

Kodak Ferrotype Plate Polish Should be applied to the plates after a warm-water wash which will remove any gelatin particles that may have adhered from the paper surface. A few drops rubbed in with a soft cloth, and then polished, quickly restore original brilliance and smoothness.

Kodak Color Thermometer* Specially designed for use in processing Kodak Ektachrome Film and in other color processing. Accurate to one-half degree at the critical 75 F and 68 F temperatures required in color processing. Five thermometers, individually protected in a cardboard tube.

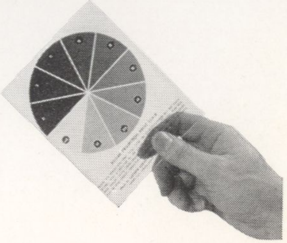
*Supplied with F scale unless otherwise specified. Also available with Centigrade scale.



← **Kodak Camel's-Hair Brushes** Ideal for dusting negatives before printing or enlarging. Tin sleeve holds the fine-quality bristles firmly. When used as intended, these brushes give long service without shedding. 1- and 2-inch sizes.

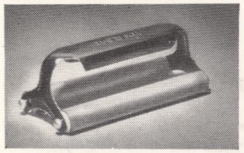
← **Kodak Spotting Colors** Come in three colors – black, white, and sepia – each on a separate cellulose card palette. The cards provide a convenient source of pigment for retouching prints or negatives.

Kodak Projection Print Scale → This handy darkroom aid will save you both paper and time. It is a negative divided into 10 sectors of varying density, each indicating a different printing time. It gives you an accurate test strip each time, with just one exposure. Complete instructions will guide you in exposure choice.



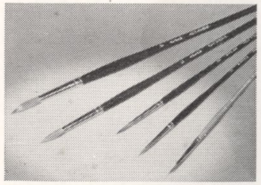
← **Kodak Combination Funnel** Made in two plastic sections which can be used as a single unit or in combination to provide, in effect, three sizes of funnels. The larger section of the funnel has an intake diameter of 5 inches and a spout diameter of 2 inches. The spout diameter of the smaller section is ½ inch.

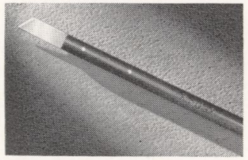
Kodak Automatic Tray Siphon Converts an ordinary → tray into an effective washer for prints or films. Attaches to water tap and adjusts for water level.



← **Kodak Double Print Roller** This is an inexpensive and efficient print roller, ideal for ferrotyping or mounting prints and enlargements within its size range. It has two 6-inch rubber rollers and a sturdy metal handle.

Kodak DeLuxe Spotting and Coloring Brushes Offered → in a series of graduated sizes. All of these fine brushes are made of excellent-quality sable hair. The number 0 brush is designed for retouching and fine-detail work. Numbers 2 and 6 are recommended for general photographic coloring purposes. The number 8 brush is well adapted for opaquing.





← **Kodak Etching Knife** Especially designed for the photographer. Blade is nickel-plated steel of correct hardness for etching and keeping its edge. The blade is bevelled on one side only and is easy to sharpen. Useful for removing black spots from prints.

Kodak Photo Blotter Roll Provides an efficient → means of drying semimatte or matte-surfaced prints. The roll counteracts tendency of prints to curl. The corrugated backing allows for free circulation of air for more rapid, uniform drying. Six feet long and 11½ inches wide. Takes 60 average-size prints.